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10/573,667	11/20/2006	Marion Bartsch	4836-21/NP	4291

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HARNESS, DICKEY & PIERCE, P.L.C.
P.O. BOX 828
BLOOMFIELD HILLS, MI 48303

EXAMINER	
AUSTIN, AARON	
ART UNIT	PAPER NUMBER
1794	
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Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Office Action Summary	Application No.	Applicant(s)	
	10/573,667	BARTSCH ET AL.	
	Examiner	Art Unit	
	AARON S. AUSTIN	1794	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE *3* MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *15 June 2009*.

2a)☐ This action is **FINAL**. 2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1-14 and 16* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1-14 and 16* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☐ The drawing(s) filed on _____ is/are: a)☐ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☒ All b)☐ Some * c)☐ None of:

1.☒ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☐ Information Disclosure Statement(s) (PTO/SB/08) Paper No(s)/Mail Date _____.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____.
5) ☐ Notice of Informal Patent Application
6) ☐ Other: _____.

DETAILED ACTION

Claim Rejections - 35 USC § 112

The following is a quotation of the first paragraph of 35 U.S.C. 112:

> The specification shall contain a written description of the invention, and of the manner and process of making and using it, in such full, clear, concise, and exact terms as to enable any person skilled in the art to which it pertains, or with which it is most nearly connected, to make and use the same and shall set forth the best mode contemplated by the inventor of carrying out his invention.

Claim 13 is rejected under 35 U.S.C. 112, first paragraph, as failing to comply with the written description requirement. The claim(s) contains subject matter which was not described in the specification in such a way as to reasonably convey to one skilled in the relevant art that the inventor(s), at the time the application was filed, had possession of the claimed invention.

In particular, claim 13 requires the ceramic coating be free of aluminum oxide. This element of the claim is considered a negative limitation unsupported by the specification. Any negative limitation or exclusionary proviso must have basis in the original disclosure. The mere absence of a positive recitation is not basis for exclusion. Any claim containing a negative limitation which does not have basis in the original disclosure should be rejected under 35 U.S.C. 112, first paragraph, as failing to comply with the written description requirement. See MPEP 2173.05(i).

Claim Rejections - 35 USC § 102

The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

> A person shall be entitled to a patent unless –

(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

Claims 1-14, and 16 are rejected under 35 U.S.C. 102(b) as being anticipated by Strangman et al. (US 5,015,502).

Strangman et al. teach a method of forming a thermal barrier coating system for superalloy components of turbine engines subjected to high operating temperatures. The method includes application of an outer ceramic coating to an alumina film overlying a metallic superalloy substrate (column 5, lines 15-20). The ceramic for formation of the ceramic coating is zirconia which has the chemical structure ZrO_2 (column 5, line 17). The thickness of the ceramic coating may be 1 to 1000 microns (column 6, lines 1-5). As the ceramic coating is the last coating applied to the component, the coating is considered to be an exposed outer layer as claimed.

Regarding claims 1-2, 5, 7-8, and 14, the thickness of the ceramic coating may be 1 to 1000 microns (column 6, lines 1-5).

Regarding claims 3-4, 14, and 16, an alumina layer is applied to the metallic component prior to application of the ceramic coating. The alumina layer is expected to provide some level of oxidation protection as it serves to separate and insulate the metallic substrate from oxidizing forces. Further, the alumina layer is expected to provide oxidation protection as like materials to those claimed are used in a like manner.

Regarding claims 6 and 13, the ceramic coating material may consist of zirconia which is an oxidic ceramic material (column 5, line 17).

Regarding claims 9-10, the ceramic coatings may be produced by EB-PVD or other vapor deposition processes of which CVD is an example (column 2, lines 40-44).

Regarding claims 11-12, the turbine component may be a turbine blade, of which rotor and stator blades are examples (column 1, line 26).

Claims 1-4, 6-9, 13-14, and 16 are rejected under 35 U.S.C. 102(b) as being anticipated by Ulion et al. (US 5,262,245).

Ulion et al. teach a superalloy turbine engine component under thermal and mechanical stress including a metallic superalloy substrate component to which is applied an outer ceramic coating (e.g., claim 1). The most preferred ceramic for formation of the ceramic coating is zirconia which has the chemical structure ZrO_2 (column 2, lines 38-41). The thickness of the ceramic coating may be 25 to 500 microns (e.g., claim 2 and column 6, lines 14-18). As the ceramic coating is the last coating applied to the component, the coating is considered to be an exposed outer layer as claimed.

Regarding claims 1-2, 7-8, and 14, the thickness of the ceramic coating may be 25 to 500 microns (e.g., claim 2 and column 6, lines 14-18).

Regarding claims 3-4, 14, and 16, an alumina layer is applied to the metallic component prior to application of the ceramic coating. The alumina layer is expected to provide some level of oxidation protection as it serves to separate and insulate the metallic substrate from oxidizing forces. Further, the alumina layer is expected to

provide oxidation protection as like materials to those claimed are used in a like manner.

Regarding claims 6 and 13, the ceramic coating material may consist of yttria stabilized zirconia which is an oxidic ceramic material (column 6, lines 22-23).

Regarding claim 9, the ceramic coatings may be produced by EB-PVD (column 6, line 32).

Claim Rejections - 35 USC § 103

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

Claim 9 is rejected under 35 U.S.C. 103(a) as being unpatentable over Ulion et al. (US 5,262,245) in view of Stolle et al. (US 6,737,110).

Ulion et al. teach a coated turbine engine component as described above. The ceramic coatings may be produced by EB-PVD (column 6, line 32).

Ulion et al. do not teach the use of CVD to form the coating.

However, Stolle et al. teach CVD provides a more comprehensive method as compared to EB-PVD when applying an outer zirconia layer (column 2, lines 15-28). Therefore, as Stolle et al. clearly teach CVD provides advantages over EB-PVD when applying a zirconia layer, it would have been obvious to one of ordinary skill in the art at

the time of the claimed invention to apply the coating of Ulion et al. using CVD rather than EB-PVD.

Claims 11-12 are rejected under 35 U.S.C. 103(a) as being unpatentable over Ulion et al. (US 5,262,245).

Ulion et al. teach a coated turbine engine component as described above.

Ulion et al. do not teach the turbine engine component as being a rotor or stator.

However, Ulion et al. do teach application to components throughout a turbine engine requiring thermal barrier protection (column 1, lines 10-68). As rotors and stators are under thermal stress in a turbine engine, it would be obvious to one of ordinary skill in the art to apply the taught thermal barrier coating to rotors and/or stators.

Claims 1-14 and 16 are rejected under 35 U.S.C. 103(a) as obvious over Rigney et al. (US 6,455,167) in view of Strangman et al. (US 5,015,502) and Ulion et al. (US 5,262,245).

Rigney et al. teach a turbine airfoil under thermal and mechanical stress with a protective coating to combat oxidation, corrosive attack, and undesirable interactions between the substrate and bond coat (column 5, lines 41-48). The protective coating is made by applying to a metallic component 32 a thin diffusion barrier layer 33 comprised of oxidic ceramic material, a bond coat 34, and an outer ceramic topcoat 36 in sequence (Figs. 4 and 6). The exposed outer ceramic topcoat may be formed of YSZ,

yttria stabilized ZrO_2 (column 5, line 22). Thus the ceramic topcoat 36 is applied to the metallic component 32 and may therefore be considered the claimed exposed outer layer.

Regarding claims 1-2, 5, 7-8, and 14, Rigney et al. do not teach the thickness of the outer ceramic topcoat.

Strangman et al. teach a turbine engine component coated with a ceramic coating as described above. The ceramic for formation of the ceramic coating is zirconia which has the chemical structure ZrO_2 (column 5, line 17). The thickness of the ceramic coating may be 1 to 1000 microns (column 6, lines 1-5). Therefore, as Strangman et al. clearly teach an appropriate thickness for an outer zirconia coating on a turbine engine component is 1-1000 microns, it would have been obvious to one of ordinary skill in the art at the time of the claimed invention to form the outer ceramic topcoat for coating a turbine component of Rigney et al. with a thickness of 1-1000 microns. Furthermore, it would have been obvious to one having ordinary skill in the art at the time of the invention to adjust the thickness of the outer coating for the intended application, since it has been held that discovering an optimum value of a result effective variable involves only routine skill in the art. *In re Boesch*, 617 F.2d 272, 205 USPQ 215 (CCPA 1980). In the present case, the thickness of the coating is a result effective variable as it determines the amount of protection and additional cost of the component. It would be obvious to one of ordinary skill in the art to discover an optimum value for the thickness that provides sufficient protection at an appropriate cost and arrive at a thickness overlapping the claimed range.

Likewise, Ulion et al. teach a turbine engine component coated with a ceramic as described above. The most preferred ceramic for formation of the ceramic coating is zirconia which has the chemical structure ZrO_2 (column 2, lines 38-41). The thickness of the ceramic coating may be 25 to 500 microns (e.g., claim 2 and column 6, lines 14-18). Therefore, as Ulion et al. clearly teach an appropriate thickness for an outer zirconia coating on a turbine engine component is 25-500 microns, it would have been obvious to one of ordinary skill in the art at the time of the claimed invention to form the outer ceramic topcoat for coating a turbine component of Rigney et al. with a thickness of 25-500 microns. Furthermore, it would have been obvious to one having ordinary skill in the art at the time of the invention to adjust the thickness of the outer coating for the intended application, since it has been held that discovering an optimum value of a result effective variable involves only routine skill in the art. *In re Boesch*, 617 F.2d 272, 205 USPQ 215 (CCPA 1980). In the present case, the thickness of the coating is a result effective variable as it determines the amount of protection and additional cost of the component. It would be obvious to one of ordinary skill in the art to discover an optimum value for the thickness that provides sufficient protection at an appropriate cost and arrive at a thickness overlapping the claimed range.

Regarding claims 3-4, 14, and 16, a pre-bond coat 39, such as an aluminum containing aluminide, may be applied to the metallic component prior to application of the ceramic topcoat (column 6, lines 63-64). The pre-bond coat is expected to provide oxidation protection as like materials to those claimed are used in a like manner.

Regarding claim 6, the ceramic topcoat material may consist of an oxidic ceramic material (column 5, line 22).

Regarding claim 9, the ceramic coating may be produced by EB-PVD (column 7, line 41).

Regarding claim 10, the ceramic coating may be produced by CVD (column 7, line 40).

Regarding claims 11-12, Rigney et al. teach a coating for a turbine airfoil as described above. Rigney et al. do not specifically teach the airfoil is part of a rotor or stator. However, airfoils are generally parts of rotor and stator turbine components (e.g., rotor and stator blades). In the alternative, it would be obvious to apply the coating to other rotor and stator components to one of ordinary skill in the art to obtain the benefits of resistance to turbine environmental stresses. Further, forming airfoils and other components of rotors and stators of the same materials and coatings negates changes in thermal expansion that could otherwise cause failure when subjected to the high heats of the turbine environment. Thus one of ordinary skill in the art is provided motivation to coat rotor and/or stator components, including airfoils, with the same coating to reduce the risk of failure due to differences in rates of thermal expansion.

Regarding claim 13, the oxidic material comprising the ceramic topcoat need not include alumina (column 5, line 22).

Response to Arguments

Applicant's arguments, see the Remarks, filed 6/15/09, with respect to the previous rejections under 35 USC 112 first and second paragraph, with the exception of the rejection of claim 13, have been fully considered and are persuasive in light of the present amendments. These rejections and objections have been withdrawn.

Applicant's arguments filed with respect to the rejection of claim 13 under 35 USC 112 have been fully considered but they are not persuasive. More particularly, Applicant's arguments and amendments to the other claims appear to indicate the intention was to delete claim 13 (see the amendment to claim 1 and the deletion of claim 15). However, as claim 13 was not deleted or amended, the arguments are unpersuasive and the rejection is maintained.

Applicant's arguments filed with respect to the rejections over the Rigney et al. and Ulion et al. references have been fully considered but they are not persuasive.

With respect to the Rigney et al. reference, in response to the present amendments the rejection has been changed to address the new recitation that the ceramic coating is based on zirconia and forms an exposed outer layer. It is the Examiner's position that the reference teaches the new limitations as set forth above. More specifically, a topcoat is taught as being comprised of zirconia thereby meeting the limitations of the claims. Therefore the arguments are not found persuasive.

With respect to the rejections over Ulion et al., Applicant argues the reference fails to teach each and every element of the claims as currently amended. However, the argument fails to point to any specific element of the claims not found in the reference. It is the Examiner's position that the reference teaches the new limitations as set forth above. Therefore the arguments are not found persuasive.

In response to Applicant's argument that the Rigney et al. and Ulion et al. references are not directed toward coatings used to prevent rumpling of the metallic components, a recitation of the intended use of the claimed invention must result in a structural difference between the claimed invention and the prior art in order to patentably distinguish the claimed invention from the prior art. If the prior art structure is capable of performing the intended use, then it meets the claim. In the present case, the references teach a method of formation with materials and steps overlapping the claim language as set forth above. Therefore, as like materials are used in a like manner, the coatings provided by the references are considered to perform the claimed rumple prevention.

Conclusion

The prior art made of record and not relied upon is considered pertinent to applicant's disclosure.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to AARON S. AUSTIN whose telephone number is

(571)272-8935. The examiner can normally be reached on Monday-Friday: 7:30 AM to 4:00 PM.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Jennifer McNeil can be reached on (571) 272-1540. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

/Aaron S Austin/
Examiner, Art Unit 1794